# SOLAR CELL ARRANGEMENT FOR AN ELECTRICALLY DRIVABLE MOTOR VEHICLE, AND MOTOR VEHICLE

**[0001]** The invention concerns a solar cell arrangement for an electrically drivable motor vehicle, having at least one flexible structure, at least one inflatable chamber which is arranged or formed on the flexible structure, at least one solar cell unit arranged on the flexible structure, and at least one transfer device connected to the chamber for transferring the flexible structure from a slack storage state into a tensioned function state. The invention furthermore concerns a motor vehicle with at least one electric drive device.

**[0002]** An electrically drivable motor vehicle, in particular an electric vehicle, or its electric drive energy accumulator can be electrically charged by means of solar cells arranged on the motor vehicle. The problem is that the surface of a motor vehicle available for fitting the solar cells is relatively restricted and therefore not sufficiently large.

**[0003]** US 2012/0 146 358 A1 discloses a protective tarpaulin system for a motor vehicle. This system has a flexible tarpaulin for at least partially covering and protecting the motor vehicle, wherein the tarpaulin defines a longitudinal direction which extends in the longitudinal direction over the vehicle. The tarpaulin is provided with at least one stiffening element which extends substantially in the longitudinal direction and gives a certain stiffness to the flexible tarpaulin, in order to facilitate the process of covering the motor vehicle with the tarpaulin.

**[0004]** U.S. Pat. No. 7,984,746 B2 discloses a system for extending a cover under activation by an active material. The system has a mechanical arrangement with a plurality of mutually connected parts which are fixedly coupled to the cover and can be switched between an extended and a stowed state, wherein the cover is also extended and stowed. The system furthermore comprises an actuator with an element of an active material which can be operated to undergo a change when activated. The actuator is connected for drive purposes to the arrangement, and configured to transmit a linear translation force to at least one of the parts, in order to cause the at least one part to move in translational fashion as a result of the change and switch the arrangement between the extended and the stowed state because of the translational movement of the at least one part. The actuator has a slider which can be moved in a linearly translational fashion, wherein the element is an SMA wire which can be operated to cause the slider to move in translational fashion because of the change. The actuator furthermore comprises an antagonistic element which is configured to reverse the translational movement of the slider. The cover is brought to extend because of the translational movement of the slider, and to stow itself when the translational movement of the slider is reversed. The SMA wire and the antagonistic element are coupled to the slider. The arrangement furthermore comprises a T-shaped frame which is fixedly connected to the cover and connected pivotably to the slider, wherein the cover is brought to extend by handling of the frame.

**[0005]** CN 203 580 587 U discloses a flexible solar cell cover for a motor vehicle. The flexible solar cell cover has an auto-covering fabric, a plurality of flexible thin-layer solar cells, a central shaft and a coil spring, wherein the flexible thin-layer solar cells are arranged on the auto-covering fabric, the central shaft is arranged on a rear bumper or in a luggage compartment, the coil spring and the central shaft are fixed, one edge of the auto-covering fabric is attached to the central shaft, and a hook is arranged at an edge of the auto-covering fabric parallel to the center shaft and attached to a front bumper of the motor vehicle when the flexible solar cell cover is unfolded.

**[0006]** FR 2 941 200 A1 discloses a shield for a motor vehicle with a set of organic solar cells connected in series, wherein the shield covers the motor vehicle partly or completely when the shield is in an extended position. An unoccupied zone has no solar cells and is permeable to solar irradiation. A hook unit cooperates with a fixing unit on a side and/or a bumper of the motor vehicle so that the shield is held in the extended position. A connector of the shield is attached to a connector of a battery of the motor vehicle.

**[0007]** U.S. Pat. No. 9,815,359 B2 discloses an automated vehicle solar protection with a chamber which can be mounted on a roof of the vehicle, a flexible shield, a plurality of rods coupled to the flexible shield, a drive device coupled to the plurality of rods, and a spindle which is coupled to the flexible shield and can be actuated by the drive device. The plurality of rods can be retracted and extended so that the solar protection can be repeatedly switched between an extended position and a retracted position. In the retracted position, the flexible shield, the plurality of rods and the drive device are enclosed in the chamber. The solar protection also turns the spindle by actuation of the drive device to ensure that the solar protection can be extended and retracted without catching and tearing, and to easily fit in the compartment.

**[0008]** CN 106 476 591 A discloses a portable motor vehicle solar shield with a protective upper shell, wherein a hollow support is arranged vertically in the middle of the protective upper shell in a penetrating fashion. An upper outlet of the hollow support is connected to a lower air outlet of an inflation pump. A storage battery is fixedly arranged on the top of the inflation pump and conductively connected to the inflation pump. A solar cell panel is arranged on the top of the accumulator. The storage battery is used to store electrical energy which is converted from solar energy by the solar cell panel and provides working power for the inflation pump. The hollow support is connected to a solar shield retraction mechanism which is driven by the inflation pump in order to expand the fabric of the solar shield, and the fabric of the solar shield retracts when the inflation pump is switched off.

**[0009]** CN 206 086 320 U discloses a foldable sun protection panel with solar cells for a motor vehicle.

**[0010]** The invention is based on the object of providing a more effective solar cell arrangement of the type cited initially.

**[0011]** According to the invention, the object is achieved by a solar cell arrangement with the features of claim **1**, in which at least one element of a shape-memory polymer is arranged on the flexible structure, and/or the flexible structure is formed at least partially from a shape-memory polymer, and/or a wall of the chamber is formed at least partially from a shape-memory polymer.

**[0012]** It is pointed out that the features and measures listed individually in the description below may be combined in any technically sensible fashion and indicate further embodiments of the invention. The description characterizes and specifies the invention further, in particular in conjunction with the figures.